

What is claimed is:

1 1. A method for making crystal resonators comprising the steps
2 of:

3 forming a pair of primary electrodes disposed roughly at
4 the center of an AT-cut crystal substrate;

5 forming a pair of secondary electrodes on said AT-cut
6 crystal substrate, which are formed in a shape surrounding said
7 primary electrodes and are electrically short-circuited;

8 grounding said secondary electrodes and measuring a
9 frequency of a two-terminal pair circuit, with one of said pair
10 of primary electrodes and said secondary electrodes serving as
11 input terminals and another of said pair of primary electrodes
12 and said secondary electrodes serving as output terminals; and
13 performing frequency adjustments when there is a difference
14 between a measured frequency and a desired frequency.

1 2. A method for making crystal resonators comprising the steps
2 of:

3 forming on one main surface of an AT-cut crystal substrate,
4 a cavity, first and second grooves disposed rightward and leftward
5 from said cavity, third and fourth grooves disposed on either
6 outer side of said first and second grooves, and fifth and sixth
7 grooves formed perpendicular to the first and the second groove;

8 forming a pair of primary electrodes on said AT-cut crystal
9 substrate, which are aligned roughly to the center of said cavity;

10 forming a pair of secondary electrodes on said AT-cut
11 crystal substrate, which are formed in a shape surrounding said
12 primary electrodes and are electrically short-circuited;

13 grounding said secondary electrodes;

14 measuring a frequency of a two terminal pair circuit; and

15 performing a frequency adjustment if there is a difference
16 between a measured frequency and a desired frequency, an input
17 terminal for said measuring being formed by respectively

18 connecting a first pair of pad electrodes disposed at positions
19 between said first and third grooves with one of said pair of
20 primary electrodes and said secondary electrodes, and an output
21 terminal for said measuring being formed by respectively
22 connecting a second pair of pad electrodes disposed between said
23 second and fourth grooves with the other of said pair of primary
24 electrodes and said secondary electrodes.

1 3. The method for making crystal resonators as described in
2 claim 2, further comprising:

3 forming one of said crystal resonators is obtained by
4 dividing along said first, second, fifth, and sixth grooves.

1 4. An AT-cut crystal substrate for forming piezoelectric
2 resonators, said AT-cut crystal substrate comprising:

3 a pair of primary electrodes disposed roughly at the center
4 of said AT-cut crystal substrate; and

5 a pair of secondary electrodes, which are formed in a shape
6 surrounding said primary electrodes and are electrically
7 short-circuited, wherein:

8 said secondary electrodes are grounded; and

9 one of said pair of primary electrodes and said secondary
10 electrodes serve as input terminals and another of said pair of
11 primary electrodes and said secondary electrodes serve as output
12 terminals.

1 5. An AT-cut crystal substrate for forming piezoelectric
2 resonators, said AT-cut crystal substrate comprising:

3 a cavity formed on one main surface of said AT-cut crystal
4 substrate;

5 a pair of primary electrodes aligned roughly to the center
6 of said cavity;

7 a pair of secondary electrodes, which are, formed in a shape

8 surrounding said primary electrodes and are electrically
9 short-circuited, said secondary electrodes being grounded;
10 first and second grooves disposed rightward and leftward
11 from said cavity;
12 third and fourth grooves disposed on either outer side of
13 said first and second grooves;
14 fifth and sixth grooves formed perpendicular to the first
15 and the second grooves;
16 an input terminal for said measuring formed by respectively
17 connecting a first pair of pad electrodes disposed at positions
18 between said first and third grooves with one of said pair of
19 primary electrodes and said secondary electrodes; and
20 an output terminal for said measuring formed by
21 respectively connecting a second pair of pad electrodes disposed
22 between said second and fourth grooves with the other of said pair
23 of primary electrodes and said secondary electrodes.

1 6. The AT-cut crystal substrate as described in claim 5,
2 wherein one of said piezoelectric resonators is obtained by
3 dividing along said first, second, fifth, and sixth grooves.